CLAIMS

1. A spectral acquisition system, comprising:

an exploration subsystem operative to expose interior portions of a three-dimensional sample, and

a spectral acquisition subsystem operative to acquire images of the interior portions exposed by the exploration subsystem.

2. The apparatus of claim 1 wherein the exploration subsystem includes a cutting implement and a guide.

3. The apparatus of claim 2 wherein the exploration subsystem includes an actuator operative to advance the cutting implement.

4. The apparatus of claim 1 wherein the exploration subsystem is operative in the field of view of the spectral acquisition system.

5. The apparatus of claim 1 further including a mechanical link, an electrical link, and a digital link between the exploration subsystem and the spectral acquisition system.

6. The apparatus of claim 1 further including a control module operative to control the exploration subsystem and process information from the spectral acquisition system.

7. The apparatus of claim 1 wherein the spectral acquisition system includes a two-dimensional array detector and a spectrally selective device.

8. The apparatus of claim 1 wherein the spectral acquisition subsystem operates in near-infrared or mid-infrared spectral regions.

9. The apparatus of claim 1 further including an airborne waste collection system having an inlet proximate the exploration subsystem.

10. The apparatus of claim 1 wherein the exploration subsystem includes a sample embedding substance.

11. A spectral acquisition method, comprising:

actively processing a sample to expose characteristics of interior portions of the sample, and

acquiring spectral information from the interior portions of the sample exposed in the step of exposing.

12. The method of claim 11 wherein the steps of actively processing and acquiring are applied to a friable material and further including the step of preparing the friable material to withstand the step of actively processing before the step of actively processing.

13. The method of claim 12 wherein the steps of preparing, actively processing, and acquiring are applied to a bulk pharmaceutical material.

14. The method of claim 12 wherein the steps of preparing, actively processing, and acquiring are applied to a pharmaceutical dosage unit.

15. The method of claim 12 wherein the steps of preparing, actively processing, and acquiring are applied to a pharmaceutical tablet including at least one active ingredient and one inert ingredient.

16. The method of claim 12 wherein the step of preparing includes fixing the sample in a fixing material and the step of actively processing includes cutting the sample.

17. The method of claim 11 further including repeating the steps of actively processing and acquiring to create a data set of information about different interior portions of the sample.

18. The method of claim 17 further including a step of selecting a spatial separation between the steps of actively processing to be on the same order as that of a spatial resolution of the step of acquiring.

19. The method of claim 17 further including a step of interpolating data received from the steps of acquiring to adjust for a spatial separation between the steps of actively processing.

20. The method of claim 11 wherein the steps of actively processing expose planar interior surfaces.

21. The method of claim 11 wherein the step of actively processing and the step of acquiring both take place with the sample in a position constrained in at least one dimension.

22. The method of claim 11 wherein the step of actively processing and the step of acquiring both take place as part of an automated sequence.

23. The method of claim 11 further including steps of processing the spectral information acquired in the step of acquiring to obtain two-dimensional chemical image planes and reconstructing at least one three-dimensional image from the two dimensional chemical image planes.

24. The method of claim 11 wherein the step of acquiring operates in near-infrared or mid-infrared spectral regions.

22. A spectral acquisition system, comprising:
means for holding a friable pharmaceutical tablet,
means for exposing interior portions of the friable pharmaceutical tablet, and
means for obtaining spectral images of the exposed interior portions.

23. The apparatus of claim 22 wherein the means for holding include means for embedding the pharmaceutical tablet.

24. The apparatus of claim 22 wherein the means for holding include a holding wax.

25. The apparatus of claim 22 wherein the means for exposing includes a cutting implement and a guide.

26. The apparatus of claim 25 wherein the means for exposing includes means for advancing the cutting implement.

27. The apparatus of claim 22 wherein the means for holding are operative to hold the pharmaceutical tablet in a field of view of the means for obtaining spectral images during operation of the means for exposing.

28. The apparatus of claim 22 further including a mechanical link, an electrical link, and a digital link between the means for exposing and the means for obtaining spectral images.

29. The apparatus of claim 22 further including means for controlling the means for exposing and for processing information from the means for obtaining spectral images.

30. The apparatus of claim 22 wherein the means for obtaining spectral images operate in near-infrared or mid-infrared spectral regions.

31. The apparatus of claim 33 further including means for collecting airborne waste from the means for exposing.

32. A spectral acquisition method comprising,

positioning a pharmaceutical tablet within an optical field of view of an acquisition system,

removing material from the tablet within the field of view, and

acquiring an image of the tablet by the acquisition system after the step of removing.

33. The method of claim 32 wherein the steps of removing and acquiring are applied to a friable tablet and further including the step of preparing the friable tablet to withstand the step of removing.

34. The method of claim 33 wherein the steps of preparing, removing, and acquiring are applied to a pharmaceutical tablet including at least one active ingredient and one inert ingredient.

35. The method of claim 33 wherein the step of preparing includes fixing the sample in a fixing material and the step of removing includes cutting the sample.

36. The method of claim 33 wherein the step of preparing includes fixing the sample in a fixing material and the step of removing includes cutting the sample with a blade.

37. The method of claim 33 wherein the step of preparing includes fixing the sample in a fixing material and the step of removing includes cutting the sample with a rotating blade.

38. The method of claim 32 further including repeating the steps of removing and acquiring to create a data set of information about different interior portions of the sample.

39. The method of claim 38 further including a step of selecting a spatial separation between the steps of removing to be on the same order as that of a spatial resolution of the step of acquiring.

40. The method of claim 38 further including a step of interpolating data received from the steps of acquiring to adjust for a spatial separation between the steps of removing.

41. The method of claim 32 wherein the step of removing and the step of acquiring both take place with the sample in a position constrained in at least one dimension.

42. The method of claim 32 wherein the step of removing and the step of acquiring both take place as part of an automated sequence.

43. The method of claim 32 further including steps of processing the spectral information acquired in the step of acquiring to obtain two-dimensional chemical image planes and reconstructing at least one three-dimensional image from the two dimensional chemical image planes.

44. The method of claim 32 further including the step of obtaining the tablet as a sample of a tablet making process and wherein the steps of obtaining, removing, and acquiring take place as part of a quality control process for the tablet making process that includes further steps of obtaining, removing, and acquiring.

45. The method of claim 32 further including the step of obtaining the tablet from a formulation-phase experiment.

46. The method of claim 32 wherein the steps of removing and acquiring take place as part of a root-cause analysis process.

47. The method of claim 32 wherein the step of acquiring an image acquires an image in near-infrared or mid-infrared spectral regions.

48. The method of claim 32 wherein the step of acquiring is operative to obtain an image reflected from a surface of the tablet exposed by the step of removing.

49. The method of claim 32 wherein the step of acquiring is operative to obtain an image from material removed by the step of removing.